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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/514,526 02/28/00 FARQUHAR

D END000006US1

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IM22/1023

EXAMINER

SMETANA, J

ART UNIT

PAPER NUMBER

1746

DATE MAILED:

10/23/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/514,526

Applicant(s)

FARQUHAR ET AL.

Examiner

Jiri F. Smetana

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2000.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 1-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 18-25 and 28-30 is/are rejected.
- 7) ☒ Claim(s) 26 and 27 is/are objected to.
- 8) ☒ Claim(s) 1-17 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 March 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☒ Interview Summary (PTO-413) Paper No(s). 7.
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 & 5. 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-17, drawn to a method, classified in class 216, subclass 108.

II. Claims 18-30, drawn to a product, classified in class 420, subclass 8.

2. The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by plasma etching.

3. Because these inventions are distinct for the reasons given above, have acquired a separate status in the art as shown by their different classification, and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Lawrence R. Fraley on October 9, 2001 a provisional election was made with traverse to prosecute the invention of Group II, claims 18-30. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-17 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the

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application. Any amendment of inventorship must be accompanied by a petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 19, 24, and 25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claim 19, it is unclear whether the chromium volume itself is an "oxide of chromium and metallic chromium" or whether the "oxide of chromium and metallic chromium" is a layer on top of the chromium volume.

Claim s 24 and 25 recite the limitation "the layer of conductive metal". There is insufficient antecedent basis for this limitation in the claim. It is suggested Applicant amend these claims to depend upon claim 23.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 18 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Cashau et al., U.S. Patent No. 3,539,408.

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The claimed invention reads on Cashau as follows: Cashau (Figures 1-4) discloses an electrical structure comprising a chromium volume (column 3, lines 21-22); an iron-comprising body in continuous electrical contact with the chromium volume (column 3, lines 43-50); and hydrochloric acid solution is in continuous contact with both the chromium volume and the iron-comprising body (column 3, lines 72-73), wherein the chromium body is being etched at an etch rate (column 3, lines 49-50).

The elements in the claims are read in the reference.

10. Claims 18 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by R.G. Frieser, IBM Technical Disclosure Bulletin, *Etchability of Chromium Films*, Vol. 13, No. 4, Sept. 1970.

The claimed invention reads on Frieser as follows: Frieser discloses an electrical structure comprising a chromium volume; an iron-comprising body in continuous electrical contact with the chromium volume; and hydrochloric acid solution is in continuous contact with both the chromium volume and the iron-comprising body, wherein the chromium body is being etched at an etch rate (abstract).

The elements in the claims are read in the reference.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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12. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over R.G. Frieser, IBM Technical Disclosure Bulletin, *Etchability of Chromium Films*, Vol. 13, No. 4, Sept. 1970.

Recitation of Frieser is repeated here from above.

Frieser does not explicitly disclose a fluoropolymer dielectric volume bonded to the chromium volume. However, Frieser does disclose wherein a photoresist volume is bonded to the chromium volume (abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to bond a fluoropolymer dielectric volume to the chromium volume because fluoropolymer dielectric materials are conventionally used as photoresist masks in the etching of metallic films and the integrated electrical circuit fabrication industry. The use of conventional materials to perform their known functions in a conventional process is obvious. *In re Raner* 134 USPQ 343 (CCPA 1962).

13. Claims 19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cashau as applied to claims 18 and 20 above, in view of Szupillo, U.S. Patent No. 3,616,349.

Recitation of Cashau is repeated here from above.

Casau does not disclose wherein the chromium volume includes an oxide of chromium and metallic chromium nor wherein the iron-comprising body includes steel. However, Szupillo discloses wherein the chromium volume includes an oxide of chromium and metallic chromium (column 2, lines 36-51).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Casau in view of Szupillo because Szupillo teaches that improved pattern edge definition and line resolution is provided and wherein the etching rate can

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be controlled over a wider range (column 1, lines 51-69). As for claim 22, it would have been obvious to etch with an iron-comprising body which includes steel because Szupillo teaches that the probe may be composed of any metal of the electrochemical series which is capable of displacing chromium (column 2, lines 48-51). Further, the use of conventional materials to perform their known functions in a conventional process is obvious. *In re Raner* 134 USPQ 343 (CCPA 1962).

14. Claims 19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frieser as applied to claims 18 and 20 above, in view of Szupillo, U.S. Patent No. 3,616,349.

Recitation of Frieser is repeated here from above.

Frieser does not disclose wherein the chromium volume includes an oxide of chromium and metallic chromium nor wherein the iron-comprising body includes steel. However, Szupillo discloses wherein the chromium volume includes an oxide of chromium and metallic chromium (column 2, lines 36-51).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Frieser in view of Szupillo because Szupillo teaches that improved pattern edge definition and line resolution is provided and wherein the etching rate can be controlled over a wider range (column 1, lines 51-69). As for claim 22, it would have been obvious to etch with an iron-comprising body which includes steel because Szupillo teaches that the probe may be composed of any metal of the electrochemical series which is capable of displacing chromium (column 2, lines 48-51). Further, the use of conventional materials to perform their known functions in a conventional process is obvious. *In re Raner* 134 USPQ 343 (CCPA 1962).

15. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Casau as applied to claims 18 and 20 above, in view of Innokent, U.S. Patent No. 3,630,795.

Recitation of Casau is repeated here from above.

Casau does not disclose wherein the acid solution is in spray form. However, Innokent discloses wherein the acid solution is in spray form (column 2, lines 55-73).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the invention of Casau in view of Innokent because Innokent teaches that micron sized fine lines can be patterned in thin films by spraying an etchant on the metallic film (column 1, lines 43-71).

16. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Frieser as applied to claims 18 and 20 above, in view of Innokent, U.S. Patent No. 3,630,795.

Recitation of Frieser is repeated here from above.

Frieser does not disclose wherein the acid solution is in spray form. However, Innokent discloses wherein the acid solution is in spray form (column 2, lines 55-73).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the invention of Frieser in view of Innokent because Innokent teaches that micron sized fine lines can be patterned in thin films by spraying an etchant on the metallic film (column 1, lines 43-71).

17. Claims 23-25, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Casau as applied to claims 18 and 20 above, in view of Abolafia et al., U.S. Patent No. 4,160,691.

Recitation of Casau is repeated here from above.

Casau does not disclose wherein the chromium volume includes a layer of chromium on a layer of conductive metal nor wherein the temperature and molarity of the hydrochloric acid is within a triangle space defined by temperature (T) and molarity (M) points of (21°C, 2.4M), (52°C, 2.4M), and (52°C, 1.2M). However, Abolafia discloses wherein the chromium volume includes a layer of chromium on a layer of conductive metal of copper (column 1, lines 17-23), wherein the conductive metal of copper is in contact with the acid solution of HCl (column 1, lines 38-40) and wherein the temperature and molarity of the hydrochloric acid is within a triangle space defined by temperature (T) and molarity (M) points of (21°C, 2.4M), (52°C, 2.4M), and (52°C, 1.2M) (column 1, lines 23-32, 44-47; column 2, lines 32-39).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the invention of Casau in view of Abolafia because Abolafia teaches that it is known to effectively etch chromium in HCl wherein chromium is in contact with copper (column 1, lines 17-23).

18. Claims 23-25, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frieser as applied to claims 18 and 20 above, in view of Abolafia et al., U.S. Patent No. 4,160,691.

Recitation of Frieser is repeated here from above.

Frieser does not disclose wherein the chromium volume includes a layer of chromium on a layer of conductive metal nor wherein the temperature and molarity of the hydrochloric acid is within a triangle space defined by temperature (T) and molarity (M) points of (21°C, 2.4M), (52°C, 2.4M), and (52°C, 1.2M). However, Abolafia discloses wherein the chromium volume includes a layer of chromium on a layer of conductive metal of copper (column 1, lines 17-23),

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wherein the conductive metal of copper is in contact with the acid solution of HCl (column 1, lines 38-40), wherein the temperature and molarity of the hydrochloric acid is within a triangle space defined by temperature (T) and molarity (M) points of (21°C, 2.4M), (52°C, 2.4M), and (52°C, 1.2M) (column 1, lines 23-32, 44-47; column 2, lines 32-39), and wherein the etching time to remove 800 angstroms of chromium is about 30 seconds (≈ 26.5 angstroms/second) (column 2, line 68 - column 3, line 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the invention of Frieser in view of Abolafia because Abolafia teaches that it is known to effectively etch chromium in HCl wherein chromium is in contact with copper (column 1, lines 17-23).

Allowable Subject Matter

19. Claims 26 and 27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

20. The following is a statement of reasons for the indication of allowable subject matter:

Recitation of Cashau, Frieser, Szupillo, Innokent, and Abolafia are repeated here from above. However, neither of the references teach or disclose wherein the conductive metal includes an opening extending through its thickness and exposing the layer of chromium.

Arora et al., U.S. Patent No. 4,279,715, discloses a method of etching aluminum foil with 1.0 to 1.8 M and 35°C to 55°C hydrochloric acid (abstract). However, Arora fails to teach the etching of chromium with this particular etchant solution.

Barnabe, U.S. Patent No. 4,437,926, discloses a method of etching chromium and 10% HCl with an anode (column 3, lines 11-66). However, Barnabe fails to disclose wherein the electrode is in contact with the chromium volume.

Eckler et al., U.S. Patent No. 4,247,377, discloses a method of electrolytic etching of chromium with a solution of HCl (column 4, lines 22-34). However, Eckler also fails to disclose wherein the electrode is in contact with the chromium volume.

Conclusion

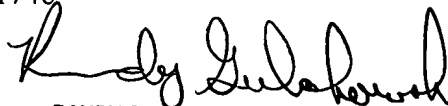
21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jiri F. Smetana whose telephone number is (703)605-1173. The examiner can normally be reached on Monday-Friday (7:30am-4:30pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on (703)608-4333. The fax phone numbers for the organization where this application or proceeding is assigned are (703)305-7718 for regular communications and (703)305-3599 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0661.

Jiri F. Smetana
Patent Examiner
Art Unit 1746

jfs
October 17, 2001


RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700